

# **Newsletter**

Volume 11, Number 6  
November - December 1994

## Director's Note

Some noteworthy milestones in the continuing growth of the Institute's program are highlighted in this issue of the IES Newsletter.

The announcement of an effort to fund the Hutchinson Chair, and the formal dedication of the new auditorium coincided one pleasant evening in October. G. Evelyn Hutchinson never had been able to visit the Institute, but I was fortunate to meet with him at his home in New Haven not long before he died in 1991. He was an inspiration to his students and to other ecologists, including myself.

More than great oaks from little acorns grow! Institute scientists are uncovering a link between acorns and the ecology of Lyme disease. For about 10 years, observation, creative problem solving, careful data collection and analysis, and close collaboration among ecologists have led to some interesting hypotheses. The story begins on page 2. Clearly, there will be more to report in the years ahead.

The IES Newsletter is published by the Institute of Ecosystem Studies, located at the Mary Flagler Cary Arboretum in Millbrook, New York. All newsletter correspondence should be addressed to the editor.

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## Mellon Grant Leads Hutchinson Chair Endowment

At the dedication of the new IES auditorium (see article below), Ms. Gretchen Long Glickman, chairman of the Institute's board of trustees, announced that The Andrew W. Mellon Foundation has made a lead challenge grant of \$1 million toward the establishment of an endowed chair — the Hutchinson Chair — at the Institute of Ecosystem Studies. In addition, the Robert W. Woodruff Foundation has awarded the first matching grant of \$100,000. The Hutchinson Chair, named for the eminent scientist G. Evelyn Hutchinson, is the first endowed chair to be designated at IES.

G. Evelyn Hutchinson, on the Yale University faculty for six decades, was first and foremost a limnologist — a scientist whose area of expertise is lakes, ponds and streams. His *Four Treatises on Limnology* represent a monumental synthesis of this discipline. Hutchinson's graduate courses in ecological principles and biogeochemistry stimulated a generation of Yale graduate students. His intellectual leadership spawned not only ideas and approaches that represent the core of ecological thought

today, but also produced the next generation of leaders in the field of ecology. He was arguably the most influential ecologist of the twentieth century.

The establishment of "chairs", frequently named after distinguished scholars, scientists or other individuals, is one way in which academic institutions maintain and strengthen their programs. The endowment is invested to maintain value despite inflation, while earnings provide annual income to support the defined need. The chair offers long-term stability and funding that will last in perpetuity. At IES, the Hutchinson Chair will be held by a distinguished senior staff scientist, and will release the funds needed to add diversity to the current scientific staff through an additional staff appointment.

An endowment of \$2.5 million is required to fund the needs of the Hutchinson Chair. The balance needed to meet the Andrew W. Mellon challenge grant and reach the established goal is to be raised by the end of 1999.



Ms. Gretchen Long Glickman announced the establishment of the Hutchinson Chair at the dedication of the IES auditorium. In the front row, left to right, are Dr. Gene E. Likens, Mr. Edward Ames, Mr. Willie Ruff and Mr. Dwiki Mitchell.

## IES Auditorium Opens

This autumn the IES auditorium proudly opened its doors. This new facility, designed by Poughkeepsie Architect Mr. James L. Flynn, is adjacent to the Plant Science Building and features a 151-seat lecture hall, a large conference room and three offices for visiting scientists. The building is designed to permit installation of a state-of-the-art communications system, which will include equipment for

teleconferencing. Institute scientists and educators will thereby have the capability to participate in regional, national and global meetings and conferences without the costs and time involved in travel.

Some 150 Institute staff, trustees and contributors to the auditorium campaign attended the October 21 official dedication.

*continued on page 3*

# The Acorn Connection

When deer ticks carrying the spirochete (a type of bacterium) that causes Lyme disease first were discovered in Dutchess County in 1985, Institute scientists began investigating the ecology of the tiny animals. How did tick abundance relate to habitat type? What animals, aside from the white-tailed deer, were important in the 3-stage life-cycle of the tick? What other natural factors could influence tick population levels?

As Lyme disease became an increasingly recognized human health concern in other parts of the nation, scientists in those areas began recording tick abundance. None, however, was collecting data in the types of rural habitats that characterize Dutchess County. IES animal ecologist Dr. Richard Ostfeld (below) saw this as a critical need.



IES Newsletter readers may recall the article in the summer 1992 issue (Volume 9, Numbers 3-4) describing the work of Research Experiences for Undergraduates student Obed Cepeda. Mr. Cepeda, working with Dr. Ostfeld, studied five habitat types on the Arboretum to determine where ticks were most abundant. Using a method known as "tick dragging" — pulling behind him a one-meter (one-yard) square of white corduroy to which questing ticks clung — he did a tick census across transects in maple forest, oak forest, shrubby field, hayfield and little bluestem meadow. Numbers in oak forests were more than 10 times higher than in any other habitat type.

Reflecting upon a possible reason for this finding, Dr. Ostfeld recalled that during the previous autumn the oak trees had produced a massive number of acorns. A year in which seed production is exceptionally high is known as a mast year; 1991 and 1994 were mast years for oak trees in this area. At the same time, a colleague — Dr. William McShea with the Conservation and Research Center in Front Royal, Virginia — told him that he had observed a shift of deer populations in mast years. (Deer are particularly fond of acorns and will consume little else when the opportunity arises.) Dr. Ostfeld began investigating the possibility that acorns were an important factor in the ecology of the deer tick.

The two-year life cycle of the deer tick is crucial to this scientific detective story. Adult ticks typically feed and mate on white-tailed deer in mid-autumn, then fall to the ground. Females lay their eggs in leaf or grass litter, and both adults die. (If the adult tick has not found a mammal or bird on which to feed by the onset of winter, however, it can continue to quest for a host whenever the temperature rises above the freezing point.) The eggs hatch to larvae in mid- to late-summer and these pin-point size ticks — which at this point are not carriers of the Lyme disease spirochete — quest for a host mammal on which to feed. The white-footed mouse is "preferred", for reasons not fully understood. When the mouse, or any other host, has been infected with the spirochete from a previous tick bite, each larva that feeds on it potentially can ingest bacteria and thereby become a carrier. During the fall/winter, larvae that have had their one blood-meal molt to the nymph stage, with any bacteria ingested earlier remaining in the gut. Nymphs are active in late spring and summer. The white-footed mouse again is the most common host, but just about any mammal — including humans — will do, and a nymph carrying the Lyme disease spirochete can pass it to its host while feeding. During late summer or fall, nymphs molt to adults, which tend to quest for deer, and the cycle begins again.

So, 1991 was a mast year for acorns and 1992 found high numbers of ticks in oak-dominated forests. 1992 was a year of *low* acorn production and 1993 found high numbers of deer ticks in maple forests but *not* oak-dominated forests. Dr. Ostfeld saw that the pattern of larval abundance related

directly to acorn production. With the large acorn crop this fall, Dr. Ostfeld's hypothesis is that 1995 once again will see high larval numbers in oak forests. The deer, attracted to the abundant acorns this fall, are importing their attached adult ticks into oak forests. Thus, these forests are expected to be crawling with larval ticks next summer. White-footed mice, also with a fondness for acorns, breed all winter when acorn numbers are high (a behavior that does not happen when other types of seeds are plentiful), and get a head start in their population growth for the next summer. Another of Dr. Ostfeld's colleagues, Dr. Jerry Wolff of Oregon State University, has shown that, over a 14-year period, peak numbers of mice occur the summer following a mast year. The high numbers of well-fed mice mean that newly-hatched larvae next summer will have a high success rate when questing for a mammalian host. If Dr. Ostfeld's hypothesis is correct, then, 1996 will find large numbers of deer tick nymphs in oak forests.

To gather more evidence in support of this hypothesis, sampling across different habitat types will continue for one more season; during 1994, tick sampling was done by IES research assistants Kirsten Hazler and Julie Hart. One of the goals of Dr. Ostfeld's study is to be able to predict when and where humans will be most at risk for picking up deer ticks.

## Modeling

Other work on the ecology of Lyme disease is also ongoing at IES. Dr. Ostfeld and Dr. Josh Van Buskirk (formerly an IES post-doctoral associate — see IES Newsletter Volume 11, Number 3) have developed a computer model that can address questions not easily answered by field work. By giving the computer information on life cycles of ticks, hosts and the spirochete, the scientists can explore the possible outcomes of different host management strategies.

They have found that deer population numbers matter much less than might be expected. The model shows that even if deer densities decreased tremendously there would be little effect on ticks, because each individual deer can host literally hundreds of these parasites. However, by managing the small mammals and birds that are hosts for the juvenile stages in the tick life cycle, ticks and the spirochete might be controlled

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# Dr. Likens Elected to Royal Danish Academy

Institute Director Dr. Gene E. Likens has been elected to the Royal Danish Academy of Sciences and Letters. This honor is one of the highest that a scientist can achieve, and is especially meaningful because honorees are chosen by their peers — potentially their

toughest critics — with the goal of having only the best scientists elected.

Many countries have academies of science. The U.S. Academy of Science, proposed by Abraham Lincoln and established by an Act

of Congress, is one of the most prestigious, while the Royal Danish Academy and the Royal Swedish Academy, which bestows the Nobel prizes for physics and chemistry, are two of the oldest.

## The Acorn Connection, from page 2

more effectively. The white-footed mouse, which is thriving in today's increasingly residential landscape, picks up and transmits the spirochete very easily, while other host species are not as efficient at carrying the disease agent. Therefore, increasing the diversity of host species could mean fewer disease carriers and fewer infected nymphs. Maintaining habitat for white-footed mouse predators — owls, weasels, fox — is also an important management strategy.

### The Acorn Collection

As part of the Institute's long-term FORSTAD project (Forest Responses to Stress and Damage), Dr. Ostfeld is collaborating with IES chemical ecologist Dr. Clive Jones on a related ecological study, which brings gypsy moths — a serious pest in northeastern forests — into the acorn/mammal arena. White-footed mice are voracious predators of gypsy-moth pupae, so in years with large mouse populations one might expect that gypsy moths will be kept under control. When mouse populations crash, gypsy moths may be released from control. Over the next several years, on research plots in oak-

dominated habitats at the Mary Flagler Cary Arboretum, Drs. Ostfeld and Jones are doing a project to learn all they can about interrelationships between acorns, deer and white-footed mice, and between these and deer ticks or gypsy moths.

To increase the scientific certainty involving the relationships among acorns, mice, deer, ticks and gypsy moths, Drs. Ostfeld and Jones will test experimentally whether acorn abundance sets off the expected chain of reactions. To do this, they intend to provide acorns in a poor mast year, which 1995 is expected to be. At the beginning of November, Dr. Jones put out the call for acorns, with explanatory articles in the *Poughkeepsie Journal* and *Millbrook Round Table*. The response has been tremendous, and much appreciated by the research team. The acorn collection effort is being coordinated by research assistant Michele Richard, who reports that, to date, over 80 individuals (ranging in age from 3 to 91) and groups that include scout troops, the 4-H, garden clubs and other community



White-footed mouse with a larval deer tick attached to its ear (at tip of arrow). The ear tag is for identification.

groups have donated 1134 kilograms (2500 pounds) of acorns. In fall 1995, Drs. Ostfeld and Jones and their research assistants will spread the acorns across the experimental plots. In the meantime, the "mouse meals" are being kept in cold storage to prevent germination. Drs. Ostfeld and Jones expect that the knowledge gained from this experiment will both help people avoid Lyme disease and manage forests to reduce gypsy moth outbreaks.

## Auditorium, from page 1

Following introductory remarks by IES Director Dr. Gene E. Likens, Chairman Gretchen Long Glickman and Trustee Edward A. Ames, guests enjoyed a concert by the Mitchell-Ruff Duo. Dwiki Mitchell and Willie Ruff have been playing jazz for four decades to audiences ranging from elementary school children in New Haven, the duo's home territory, to conservatories in China. During the IES performance, Willie Ruff recalled G. Evelyn Hutchinson;

Hutchinson had been one of Ruff's professors while Ruff was a student at Yale, and they became colleagues when the latter joined the faculty of the Yale School of Music. After the performance there was a reception in the lobby, and IES scientists led tours of the new building.

The facility already is used frequently, replacing the more limited capabilities of the Plant Science Building lecture room.

The fall series of Friday afternoon seminars, open to the public, was held in the auditorium lecture hall, as was the Continuing Education Program certificate presentation ceremony and reception in November. Upcoming events to be held there, in addition to the continuing seminar series, include several Sunday Ecology Programs and Cary Conference VI.



TOM TAFT

The Institute recognizes the following individuals, foundations and corporations for contributing generously to the auditorium campaign:

Bank of Millbrook, Mr. & Mrs. Gifford R. Beal, Dr. & Mrs. Curtis Beck, Mr. & Mrs. Allan Butler, Mary Flagler Cary Charitable Trust, Mr. & Mrs. Stephen C. Kaye, Mr. & Mrs. Hamilton F. Kean, Mr. & Mrs. Richard A. Kimball, Jr., Mr. & Mrs. Michael S. Levin, James A. Macdonald Foundation, James J. McCann Foundation, Mr. & Mrs. Seth Melhado, Millbrook Tribute Garden, The Mulber Fund of the New York Community Trust, The Pinewood Foundation, Richard Allan Shankman Memorial Fund, and Ms. Elizabeth F. Tozer.

## Calendar

### CONTINUING EDUCATION

Winter/Spring semester catalogues, with a complete listing of courses and course descriptions, are available from the Gifford House. Among the winter semester offerings are:

#### *Landscape Design*

Jan. 17 (4 sessions): **Landscape Consulting**

Jan. 18 (7 sessions): **Graphics**

Jan. 23 (6 sessions): **Prin. of Landscape Design Gardening**

Jan. 19 (6 sessions): **Commercial Greenhouse Management**

Feb. 27 (6 sessions): **Fundamentals of Gardening**

Mar. 1: **Native Plants for Shady Locations**

Mar. 2 (6 sessions): **Floriculture**

Mar. 8: **Seasonal Garden -Spring**

#### *Natural Science Illustration*

Feb. 11: **Colored Pencil Drawing/Greenhouse**

Mar. 11-12: **Pen and Ink I**

#### *Biology & Earth Science*

Feb. 21 (8 sessions): **Basic Botany**

#### *Workshops*

Mar. 4: **Creating Native Wildflower Meadows**

Mar. 11: **Planting Design for Ponds and Other Wetlands**

#### *Tours and Ecological Excursions*

Mar. 2: **New York Flower Show**

Mar. 13: **New England Spring Flower Show**

Call 914/677-9643 for information on certificate programs or individual offerings, or to register.

### SUNDAY ECOLOGY PROGRAMS

Free public programs are held on the first and third Sunday of each month, except over holiday weekends. Programs begin at 2 p.m. Last-minute changes are sometimes unavoidable, so call 914/677-5359 to confirm the day's topic.

Feb. 5: **The Day Before America**, a reading and book-signing by William MacLeish, author of *The Day Before America: Changing the Nature of a Continent*. Snow date: Feb. 12.

*For general information, call the IES Education Program Office at the Gifford House Visitor and Education Center: 914/677-5359 weekdays from 8:30 a.m. - 4:30 p.m.*

Mar. 5: **Ecology and Cosmology in the Earth's Grandest Canyon**, a slide presentation by Dr. Alan R. Berkowitz.

**Note:** These two programs will be at the IES Auditorium, adjacent to the Plant Science Building. In case of poor weather, call 677-5358 after 1 p.m. to learn the status of the day's program.

### IES SEMINARS

The Institute's program of scientific seminars features presentations by visiting scientists. Free seminars are held on Friday at 3:30 p.m. at the IES Auditorium.

Jan. 13: **Changes in Riparian Woodland Structures and Function Along an Urban Wildland Gradient in the San Francisco Bay Area**, Dr. Joe McBride, Univ. of Calif. at Berkeley

Jan. 20: to be announced

Jan. 27: **Spatial Variation of Biogeochemistry in Riverine Wetlands**, Dr. Carol Johnston, Univ. of Minn. Natural Resources Research Institute

Feb. 3: **Scottish Upland Ecosystems: Heather Moors, Herbivores and Management**, Dr. Sue Hartley, Inst. of Terrestrial Ecology, U.K.

Feb. 10: **Insect Herbivory and Vegetation Dynamics**, Dr. Valerie Brown, Imperial College at Silwood Park, U.K. (IES Visiting Distinguished Scientist)

Feb. 17: **Application of Science to Functional Assessment of Wetlands**, Dr. Mark M. Brinson, East Carolina University, N.C.

Feb. 24: to be announced

Mar. 3: **Odors of Beetles and Food: How Do Trirhabda Use Them to Find Their Prairie Host Plants?**, Dr. Patrice Morrow, Univ. of Minnesota (IES Visiting Distinguished Scientist)

### GREENHOUSE

The IES greenhouse, a year-round tropical plant paradise and a site for controlled environmental research, is open until 4:00 p.m. daily except public holidays. Admission is by free permit (see below).

### IES GIFT AND PLANT SHOP

#### **New in the Shop!!**

**For children...** nature theme "Color-Me-Tees"

**For all ages ...** hand-carved stone animals from Peru; notecards by local photographers

**For healthy plants**, indoors and out ... "Doo Darling" plant stakes & "Dung Buddies"

**January Sale:** All month ... 50% off holiday items (including seasonal plants), 20% off gifts and plants, and 10% off books

**Senior Citizens Days:** 10% off on Wednesdays

### HOURS

**Winter hours: October 1 - April 30**

**Closed on public holidays.**

**Public attractions** are open Mon. - Sat., 9 a.m. - 4 p.m. & Sun. 1 - 4 p.m.; trails and roadways are closed when snow-covered.

The **IES Gift and Plant Shop** is open Mon. - Sat., 11 a.m. - 4 p.m. & Sun. 1 - 4 p.m. (The shop is closed weekdays from 1 - 1:30 p.m.)

• *All visitors must pick up a free permit at the Gifford House Visitor and Education Center on Route 44A for access to IES public attractions. Permits are available until 3 p.m. daily.*

### MEMBERSHIP

Become a member of the Institute of Ecosystem Studies. Benefits include a member's rate for IES courses and excursions, a 10% discount on Gift Shop purchases, a free subscription to the IES Newsletter, and participation in a reciprocal admissions program, with benefits at over 100 nature centers, forest preserves, gardens and conservatories in the U.S. and Canada. Individual membership is \$30; family membership is \$40. For information on memberships, call Ms. Janice Claiborne at 914/677-5343.

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